

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-054976

(43)Date of publication of application : 27.02.1996

(51)Int.Cl. G06F 3/03

G06F 3/03

(21)Application number : 06-188392

(71)Applicant : MATSUSHITA ELECTRIC IND
CO LTD

(22)Date of filing : 10.08.1994

(72)Inventor : KAWASAKI NAOTO

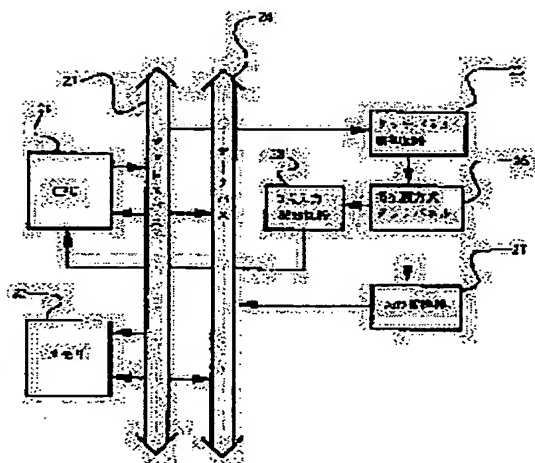
(54) RESISTANCE FILM SYSTEM TOUCH PANEL

(57)Abstract:

PURPOSE: To discriminate the coordinates of two points when the two points are simultaneously inputted in a touch panel by providing a two-point input sensing circuit and a storage circuit (memory) on a resistance film system touch panel and calculating the coordinate of the second points.

CONSTITUTION: A touch panel control circuit 25 switches the measuring axis of an input location. Now, two points are simultaneously inputted in a resistance film system touch panel 26 forming a tablet. But, even if the two points are simultaneously inputted, a slight time difference is generated in the two points any way. By using the slight time difference, the coordinate of the point inputted at first is stored in a memory 22.

When the second point is inputted, the two points input is sensed by a two-point input sensing circuit 28 and an interruption is generated in a CPU 21. The output of the touch panel 26 when the two points are simultaneously inputted is the about middle point of the two points. In this case, because the coordinate of the point inputted at first is stored in the memory 22, the coordinate of the input point of the second point can be calculated from the coordinates of the point inputted at first and the middle point of the two points.



JP8-54976A

[0001]

[Industrial Application] This invention relates to the resistance film method touch panel which personal digital assistant equipment etc. uses as an input means, and has.

[0002]

[Description of the Prior Art] Although personal digital assistant equipment etc. is marketed gradually in recent years, the resistance film method touch panel is used as an input unit in the personal digital assistant machine etc.

[0003] Below, the operation is indicated to be the conventional resistance film method touch panel. Drawing 3 is the block diagram showing the outline circuitry of the location measuring circuit using the conventional resistance film method touch panel.

[0004] For an address bus and 3, as for a touch panel control circuit and 5, a data bus and 4 are [1 / CPU and 2 / a resistance film method touch panel and 6] A/D converters.

[0005] Here, the touch panel control circuit 4 switches a x axis and the measurement shaft of the y-axis.

[0006] Next, drawing 4 is the schematic diagram having shown the circuitry when being inputted into the conventional resistance film method touch panel at two-point coincidence in strabism.

[0007] 7 -- a power source and 8 -- touch-down and 9 -- for an electrode, and 14 and 15, as for contact resistance and 18, an electrical-potential-difference detection terminal, and 19 and 20 are [an input pen, and 16 and 17 / a lower resistance film sheet, and 11, 12 and 13 / an up resistance film sheet and 10] input points.

[0008] When it is inputted into coincidence with a pen 14 and a pen 15 at the input points 19 and 20 of the up resistance film sheet 9, the electrical-potential-difference value of each input point gets across to the lower resistance film sheet 10 through contact resistance 16 and 17.

[0009] Therefore, from the electrical-potential-difference detection terminal 18, the average of the electrical-potential-difference value of input points 19 and 20 is outputted.

[0010] That is, when inputted into a resistance film method touch panel at two-point coincidence, the coordinate of the inputted middle point of two points is outputted.

[0011]

[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional configuration, in order to detect the partial pressure of the point of contact of the resistance film sheet of two sheets, when an input point is inputted into two-point coincidence, the electrical-potential-difference value concerning the combined resistance of an input point will be detected, and it had the trouble of being incorrect-inputted.

[0012] When it is the input unit which this invention solves the above-mentioned conventional trouble, and used the resistance film method touch panel in a personal digital assistant machine etc. and is inputted into two-point coincidence in here, it aims at offering the resistance film method touch panel equipped with the device in which the coordinate of two points is identified.

[0013]

[Means for Solving the Problem] In order to attain this purpose, the resistance film method touch panel of this invention compares the output voltage from the both ends of an electrical-potential-difference value detection side resistance film sheet using an electrical-potential-difference comparison means to by which the comparator etc. was used, and it has the configuration of the device which senses being inputted into two point coincidence, the store which memorizes the inputted coordinate, CPU which performs an operation, and the A/D converter which digitizes the output-voltage value from a touch panel. That is, it is a resistance film method touch panel with a resistance film method touch panel, the circuit which senses it when inputted into two-point coincidence, the A/D converter which digitizes the output voltage value from a resistance film method touch panel, CPU which performs an operation, the memory which performs a data storage, and its circumference circuit. moreover

-- desirable -- When it is the first coordinate (a, b) of the 1st point, the coordinate (x y) of the 2nd point, and the coordinate (m, n) of the midpoint of the 1st point and the 2nd point from few time difference produced when inputted into two-point coincidence, it is the resistance film method touch panel which carries out operation derivation of the coordinate (x y) of the 2nd point from $x=2m-a$ and $y=2n-b$. When a resistance film method touch panel input is carried out still more desirably at two-point coincidence, it is the resistance film method touch panel which sense what the minute potential difference produced in inter-electrode [which was arranged in the side edge as for which a resistance film method touch panel carries out phase confrontation / two] was inputted for by two-point coincidence through the comparator, and CPU is made to generate interruption, and carries out operation derivation of the coordinate (x y) of the 2nd point.

[0014]

[Function] the time of this invention being inputted into a resistance film method touch panel by having constituted in this way at two-point coincidence -- **** in the meantime -- few time difference is caught, and the coordinate of each two point can be calculated and identified.

[0015]

[Example] Hereafter, the example of this invention is explained, referring to a drawing.

[0016] Drawing 1 is the block diagram showing the outline circuitry of the location measuring circuit using the resistance film method touch panel in one example of this invention.

[0017] drawing 1 -- setting -- 21 -- CPU and 22 -- for a data bus and 25, as for a resistance film method touch panel and 27, a touch panel control circuit and 26 are [memory and 23 / an address bus and 24 / an A/D converter and 28] two-point input sensing circuits.

[0018] And the touch panel control circuit 25 changes the measurement shaft of an input location. Suppose that it was now inputted into the resistance film method touch panel 26 which accomplishes a tablet [tablet] in drawing 1 at two-point coincidence.

[0019] However, even if two points are inputted into coincidence, even when it is small to the two points, in them, time difference arises anyhow.

[0020] Memory 22 is made to memorize the coordinate of the point of having been inputted first, using few of the time difference.

[0021] And when the 2nd point is inputted, sense a two-point input in the two-point input sensing circuit 28, CPU21 is made to generate interruption, and the following processings are performed.

[0022] the output from the resistance film method touch panel 26 when being inputted into two-point coincidence -- two points -- it is the coordinate of the middle point mostly.

[0023] Since the coordinate of the point of having been inputted first is memorized by memory 22, the coordinate of the input point of the 2nd point is computable from the coordinate of the point of having been inputted first, and the middle point of two points.

[0024] If the coordinate of (x, y), and the middle point of two points is set [the coordinate of the first input point] to (m, n) for the coordinate of (a, b), and the input point of the 2nd point, the coordinate (x y) of the input point of the 2nd point will be the following, and will be made and searched for.

[0025]

$$m = (a+x)/2 \dots\dots\dots (1)$$

$$n = (b+y)/2 \dots\dots\dots (2)$$

$$\text{By the reason } x=2m-a \dots\dots\dots (3)$$

$$y=2n-b \dots\dots\dots (4)$$

Thus, the coordinate (x y) of the input point of the 2nd point is searched for from (3) and (4) types.

[0026] Moreover, drawing 2 is the block diagram showing the circuitry of the two-point input sensing circuit in one example of this invention.

[0027] As for a resistance film method touch panel, and 30 and 31, in drawing 2, 29 is [an electrode and 32] comparators.

[0028] When inputted into two-point coincidence, in drawing 2, the minute potential difference arises in an electrode 30 and an electrode 31.

[0029] A comparator 32 compares the potential difference, and when the potential difference arises, a two-point coincidence input can be sensed by outputting a signal.

[0030]

[Effect of the Invention] When it is inputted into a touch panel at two-point coincidence by establishing a two-point input sensing circuit and a store circuit (memory) in a resistance film method touch panel, and computing the coordinate of the 2nd point on it, this invention can do so effectiveness special [that implementation of the input unit excellent in the Personal Digital Assistant machine which can identify the coordinate of two points is possible], so that clearly from the above explanation.

[Claim 1] The resistance film method touch panel characterized by having a resistance film method touch panel, the circuit which senses it when inputted into two-point coincidence, the analog / digital transducer which digitizes the output voltage value from a resistance film method touch panel, CPU which performs an operation, the memory which performs a data storage, and its circumference circuit.

[Claim 2] If it is the first coordinate (a, b) of the 1st point, the coordinate (x y) of the 2nd point, and the coordinate (m, n) of the midpoint of the 1st point and the 2nd point from few time difference produced when inputted into said two-point coincidence $x=2m-a$, the resistance film method touch panel according to claim 1 characterized by carrying out operation derivation of the coordinate (x y) of the 2nd point from $y=2n-b$.

[Claim 3] What the minute potential difference produced in inter-electrode [which was arranged in the side edge as for which said resistance film method touch panel carries out phase confrontation / two] was inputted for by said two-point coincidence through the comparator when a resistance film method touch panel input was carried out at said two-point coincidence is sensed. The resistance film method touch panel according to claim 2 characterized by making said CPU generate interruption and carrying out operation derivation of said coordinate (x y) of the 2nd point.